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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/868,577	Applicant(s) KAWASAKI, KIYOHIRO	
	Examiner Brian L. Mutschler	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 February 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 3-24 is/are pending in the application.

4a) Of the above claim(s) 13-20,23 and 24 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 3-12,21 and 22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 February 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Comments

1. The objection to the abstract has been overcome by Applicant's submission of a new abstract.

2. The objection to the specification has been overcome by Applicant's amendment correcting minor informalities. Applicant's assistance in identifying and correcting the informalities is appreciated.

3. The rejection of claims 4, 5, 9, and 22 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment eliminating indefinite language. However, claims 6-8, 10, 12, and 21 still contain indefinite limitations as described below.

4. Applicant's amendment has overcome the rejections of claims 3-7 and 21 under 35 U.S.C. 102(e) by adding a limitation reciting "a means for measuring a current flowing between said electrode and said reversed polarity electrode plate." None of the cited references teach the use of a means for measuring a current between the electrodes.

Drawings

5. The drawings were received on February 25, 2004. These drawings are acceptable.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 3-10 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amendment to claim 3 added the limitation "said electrode being covered with an insulating layer" in lines 8-9. There does not appear to be support for this limitation in the originally filed specification. The specification refers insulation and an electrode in reference to the substrate, but does not disclose the use of an insulating cover on the electrode used to treat the substrate. Thus, the limitation is new matter.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 6-8, 10, 12, and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "container type" in line 11. The addition of the term "type" to otherwise definite phrases renders the claim indefinite because it is not clear

what properties are encompassed by "type." The same applies to dependent claims 8 and 10.

Claim 7 recites the limitations "container type" in line 4. The addition of term "type" to otherwise definite phrases renders the claim indefinite because it is not clear what properties are encompassed by "type." The same applies to dependent claim 21.

Claim 10 recites the limitation "the box-shaped container" in lines 7-8. There is insufficient antecedent basis for this limitation in the claim. Claim 6, from which claim 10 depends, does not recite a box-shaped container.

Claim 12 recites the limitation "container type" in lines 16-17, 23, 26, and 32. The addition of the term "type" to otherwise definite phrases renders the claim indefinite because it is not clear what properties are encompassed by "type."

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 3, 4, 6, 7, 8 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al. (U.S. Pat. No. 6,017,437) in view of Poris (U.S. Pat. No. 5,368,711).

Regarding claim 3, Ting et al. disclose an in-substrate selective electric chemical treatment system comprising:

holding means (**13**) for holding an insulating substrate (**35**) (fig. 5; col. 5, lines 14-23);

an electrode (**15**) connected, in the periphery of the insulating substrate (**35**), to a conductive pattern formed on the insulating substrate held by the holding means (**13**), wherein the electrode (**15**) is protected from the solution by an insulative seal (**42**) (figs. 5 and 9; col. 7, line 57 to col. 8, line 15);

chemical solution confining means (**12**) for confining a chemical solution in only a specified region on the insulating substrate (**35**), the specified region being smaller than the insulating substrate or slightly larger than an image displaying section on an active substrate formed on the insulating substrate (fig. 5);

a reversed polarity electrode plate (**14**) for applying an electric charge to the chemical solution, the electric charge having polarity opposite to that of the conductive pattern (fig. 5); and

chemical solution supplying (**36**) and discharging (**30, 23**) means for supplying and discharging the chemical solution to and from the insulating substrate (**35**) (fig. 5; col. 4, lines 53-61; and col. 6, line 62-64).

Regarding claim 4, Ting et al. teach the use of an electrode **14**, which is smaller than the substrate **35** and confines the chemical solution to the space between the electrode **14** and the substrate **35** (fig. 5).

Regarding claim 6, the electrode **14** is smaller than the substrate **35** (fig. 5). The chemical confining means **12** is a frame-shaped container with a flexible sealing member **42** located at the lower end (figs. 5 and 9; col. 8, lines 38-42). The system

comprises means **17** (shaft) to press the container **12** and substrate **35** together (figs. 5 and 6; col. 6, lines 5-19).

Regarding claim 7, the electrode **14** is smaller than the substrate **35** (fig. 5). The chemical confining means **12** is a box-shaped container with a flexible sealing member **42** located at the lower end (figs. 5 and 9; col. 8, lines 38-42). The system comprises means **17** (shaft) to press the container **12** and substrate **35** together (figs. 5 and 6; col. 6, lines 5-19).

Regarding claim 8, Ting et al. disclose washing means **18** to spray a washing solution (deionized water) (fig. 5; col. 9, lines 5-43).

Regarding claim 12, Ting et al. disclose an electric chemical treatment process for treating a substrate by use of an in-substrate selective electric chemical treatment system which comprises (a) holding means (**13**) for holding an insulating substrate (**35**) (fig. 5); (b) an electrode (**15**) connected, in the periphery of the insulating substrate (**35**), to a conductive pattern formed on the insulating substrate held by the holding means (**13**) (figs. 5 and 9; col. 3, lines 48-61); (c) a reversed polarity electrode plate (**14**) having a specified size and shape smaller than the insulating substrate (**35**) in accordance with a specified rule or slightly larger than an image displaying section of an active substrate formed on the insulating substrate in accordance with a specified rule (fig. 5); (d) container type chemical solution confining means (**12**) which is a frame-like or box-like container having, at its lower end or its upper and lower ends, an opening slightly larger than the reversed polarity electrode plate (**14**) and having a flexible sealing material (**42**) attached to an area around the opening at the lower end (figs. 5 and 9); and (e)

pressing means for pressing the container type chemical solution confining means (**12**) against the insulating substrate (**35**), with the reversed polarity electrode plate (**14**) being stored in the container type chemical solution confining means (fig. 5);

the treatment process comprising:

a holding step of holding the insulating substrate having the conductive pattern on the holding means (col. 4, lines 19-44);

a chemical solution supplying step of supplying a specified chemical solution to a space defined by the container type chemical solution confining means and the insulating substrate (col. 4, lines 45-61);

an electrode connecting step of connecting the electrode to the conductive pattern in the periphery of the insulating substrate (fig. 9; col. 7, line 55 to col. 9, 43); and

a substrate treatment step of applying current between the electrode and the reversed polarity electrode plate to apply a specified treatment to the insulating substrate (col. 10, line 37 to col. 12, line 22).

Regarding claim 21, Ting et al. disclose fluid supply and discharge means (**18, 19, 20, 30, 36**) for supplying and discharging at least one of a chemical solution, washing liquid and drying gas to and from the box-shaped contained (fig. 5; col. 4, lines 53-61; col. 6, line 62-64; and col. 9, lines 5-43).

The apparatus and method of Ting et al. differs from the instant invention because Ting et al. do not disclose the following:

a. Means for measuring the value of a current flowing between said electrode and said reversed polarity electrode plate, as recited in claim 3.

b. Applying a specified direct current between the electrode and the reversed polarity electrode plate, as recited in claim 12.

c. Measuring the value of a current flowing between said electrode and said reversed polarity plate, as recited in claim 12.

Regarding claims 3 and 12, Poris discloses a method of selectively electrodepositing on a semiconductor substrate and teaches that electronics **17**, including an ammeter to monitor cell current, are used to apply current in a controlled manner (col. 11, lines 7-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus and method of Ting et al. to use an ammeter and measure the current in the cell as taught by Poris because an ammeter allows the application of current in a controlled manner, which would result in a more uniform process.

Regarding claim 12, although Ting et al. do not expressly disclose the use of direct current, one skilled in the art would recognize that the use of direct current is implied by the use of the terms “anode” and “cathode” taken in combination with the disclosed processes performed in the method (electroplating and electropolishing). Additionally, alternating current would not achieve the desired results of Ting et al. because alternating current would etch any material plated in the previous cycle.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used direct current in the method of Ting et al. because it would achieve the desired results. (It is further noted that Ting et al. disclose that the polarity of the potential applied to the electrodes can be switched to change the anode to a cathode and the cathode to an anode (col. 12, lines 15-22).

12. Claims 3-7, 12, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talieh (U.S. Pat. No. 6,176,992) in view of Poris (U.S. Pat. No. 5,368,711).

Regarding claim 3, Talieh discloses an in-substrate selective electric chemical treatment system comprising:

holding means **(16)** for holding an insulating substrate **(Wafer)** (fig. 1B; col. 5, lines 38-41);

an electrode **(28)** connected, in the periphery of the insulating substrate **(Wafer)**, to a conductive pattern formed on the insulating substrate, wherein the electrode **(28)** is protected from the solution by a seal **(26)** (fig. 2);

chemical solution confining means for confining a chemical solution in only a specified region on the insulating substrate, the specified region being smaller than the insulating substrate or slightly larger than an image displaying section on an active substrate formed on the insulating substrate (fig. 2);

a reversed polarity electrode plate (**30**) for applying an electric charge to the chemical solution, the electric charge having polarity opposite to that of the conductive pattern (fig. 2); and

chemical solution supplying **(34)** and discharging (**40**) means for supplying and discharging the chemical solution to and from the insulating substrate **(Wafer)** (fig. 2).

Regarding claim 4, the electrode plate **30** has a size and shape smaller than the substrate (fig. 2). The electrode plate **30** also serves to confine the chemical solution between the electrode and the substrate (fig. 2).

Regarding claim 5, the electrode plate **30** has a size and shape smaller than the substrate (fig. 2). The electrode plate **30** also comprises a pad **32** that serves to confine the chemical solution between the electrode and the substrate (fig. 2).

Regarding claim 6, the confining means is frame-shaped, wherein a seal **26** is positioned at the lower end of the frame-shaped portion (fig. 2). The system further comprises pressing means to press the container against the substrate (col. 4, lines 3-23).

Regarding claim 7, the confining means is box-shaped, wherein a seal **26** is positioned at the lower end of the frame-shaped portion (fig. 2). The system further comprises pressing means to press the container against the substrate (col. 4, lines 3-23).

Regarding claim 12, Talieh discloses an electric chemical treatment process for treating a substrate by use of an in-substrate selective electric chemical treatment system which comprises (a) holding means (**16**) for holding an insulating substrate

(Wafer) (fig. 1B); (b) an electrode **(28)** connected, in the periphery of the insulating substrate **(Wafer)**, to a conductive pattern formed on the insulating substrate held by the holding means **(16)** (fig. 2); (c) a reversed polarity electrode plate **(30)** having a specified size and shape smaller than the insulating substrate **(Wafer)** in accordance with a specified rule or slightly larger than an image displaying section of an active substrate formed on the insulating substrate in accordance with a specified rule (fig. 2); (d) container type chemical solution confining means which is a frame-like or box-like container having, at its lower end or its upper and lower ends, an opening slightly larger than the reversed polarity electrode plate **(30)** and having a flexible sealing material **(26)** attached to an area around the opening at the lower end (fig. 2); and (e) pressing means for pressing the container type chemical solution confining means against the insulating substrate **(Wafer)**, with the reversed polarity electrode plate **(30)** being stored in the container type chemical solution confining means (fig. 2); the treatment process comprising:

a holding step of holding the insulating substrate having the conductive pattern on the holding means (col. 4, lines 3-24);

a chemical solution supplying step of supplying a specified chemical solution to a space defined by the container type chemical solution confining means and the insulating substrate (col. 4, lines 24-57);

an electrode connecting step of connecting the electrode to the conductive pattern in the periphery of the insulating substrate (fig. 2; col. 4, line 61 to col. 5, line 60); and

a substrate treatment step of applying current between the electrode and the reversed polarity electrode plate to apply a specified treatment to the insulating substrate (col. 4, line 61 to col. 5, line 60).

Regarding claim 21, the system comprises fluid supply (**34**) and discharge (**40**) means for supplying and discharging at least one of a chemical solution, washing liquid and drying gas to and from the container (fig. 2; col. 5, lines 49-52).

The apparatus and method of Talieh differs from the instant invention because Talieh does not disclose the following:

a. Means for measuring the value of a current flowing between said electrode and said reversed polarity electrode plate, as recited in claim 3.

b. Applying a specified direct current between the electrode and the reversed polarity electrode plate, as recited in claim 12.

c. Measuring the value of a current flowing between said electrode and said reversed polarity plate, as recited in claim 12.

Regarding claims 3 and 12, Poris discloses a method of selectively electrodepositing on a semiconductor substrate and teaches that electronics **17**, including an ammeter to monitor cell current, are used to apply current in a controlled manner (col. 11, lines 7-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus and method of Talieh to use an ammeter and measure the current in the cell as taught by Poris because an ammeter

allows the application of current in a controlled manner, which would result in a more uniform process.

Regarding claim 12, although Talieh does not expressly disclose the use of direct current, one skilled in the art would recognize that the use of direct current is implied by the use of the terms "anode" and "cathode" taken in combination with the disclosed processes performed in the method. Additionally, alternating current would not achieve the desired results of Talieh because alternating current would etch any material plated in the previous cycle. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used direct current in the method of Talieh because it would achieve the desired results.

13. Claims 3, 7, 12, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batz, Jr., et al. (U.S. Pat. No. 6,334,937) in view of Poris (U.S. Pat. No. 5,368,711).

Regarding claim 3, Batz, Jr., et al. disclose an in-substrate selective electric chemical treatment system comprising:

holding means (**30**) for holding an insulating substrate (**25**) (fig. 1; col. 4, lines 28-37);

an electrode (**150**) connected, in the periphery of the insulating substrate (**25**), to a conductive pattern formed on the insulating substrate, wherein the electrode (**150**) is covered by an insulating shield (**205**) (fig. 6);

chemical solution confining means (**35**) for confining a chemical solution in only a specified region on the insulating substrate (**25**), the specified region being smaller than the insulating substrate or slightly larger than an image displaying section on an active substrate formed on the insulating substrate (fig. 1);

a reversed polarity electrode plate (**55**) for applying an electric charge to the chemical solution, the electric charge having polarity opposite to that of the conductive pattern (fig. 1); and

chemical solution supplying (**50**) and discharging (**40**) means for supplying and discharging the chemical solution to and from the insulating substrate (**25**) (fig. 1).

Regarding claim 7, the confining means **35** comprise a box-shaped container that has a flexible seal **200** (fig. 6; col. 10, lines 41-50). The system further comprises pressing means that press the wafer and confining means together (col. 10, lines 41-50).

Regarding claim 12, Batz, Jr., et al. discloses an electric chemical treatment process for treating a substrate by use of an in-substrate selective electric chemical treatment system which comprises (a) holding means (**30**) for holding an insulating substrate (**25**) (fig. 1); (b) an electrode (**150**) connected, in the periphery of the insulating substrate (**25**), to a conductive pattern formed on the insulating substrate held by the holding means (**30**) (fig. 6); (c) a reversed polarity electrode plate (**55**) having a specified size and shape smaller than the insulating substrate (**25**) in accordance with a specified rule or slightly larger than an image displaying section of an active substrate formed on the insulating substrate in accordance with a specified rule (fig. 1); (d)

container type chemical solution confining means (**35**) which is a frame-like or box-like container having, at its lower end or its upper and lower ends, an opening slightly larger than the reversed polarity electrode plate (**55**) and having a flexible sealing material (**200**) attached to an area around the opening at the lower end (fig. 6); and (e) pressing means for pressing the container type chemical solution confining means against the insulating substrate (**25**), with the reversed polarity electrode plate (**55**) being stored in the container type chemical solution confining means (fig. 1); the treatment process comprising:

a holding step of holding the insulating substrate having the conductive pattern on the holding means (col. 16, line 55 to col. 18, line 7);

a chemical solution supplying step of supplying a specified chemical solution to a space defined by the container type chemical solution confining means and the insulating substrate (col. 7, lines 18-53);

an electrode connecting step of connecting the electrode to the conductive pattern in the periphery of the insulating substrate (fig. 6; col. 7, lines 18-53); and

a substrate treatment step of applying current between the electrode and the reversed polarity electrode plate to apply a specified treatment to the insulating substrate (col. 7, lines 18-53).

Regarding claim 21, the system comprises fluid supply **50** and discharge **40** means for supplying and discharging at least one of a chemical solution, washing liquid and drying gas to and from the container (fig. 1; col. 4, lines 38-65).

The apparatus of Batz et al. differs from the instant invention because Batz et al. do not disclose the following:

a. Means for measuring the value of a current flowing between said electrode and said reversed polarity electrode plate, as recited in claim 3.

b. Applying a specified direct current between the electrode and the reversed polarity electrode plate, as recited in claim 12.

c. Measuring the value of a current flowing between said electrode and said reversed polarity plate, as recited in claim 12.

Regarding claims 3 and 12, Poris discloses a method of selectively electrodepositing on a semiconductor substrate and teaches that electronics **17**, including an ammeter to monitor cell current, are used to apply current in a controlled manner (col. 11, lines 7-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus and method of Batz et al. to use an ammeter and measure the current in the cell as taught by Poris because an ammeter allows the application of current in a controlled manner, which would result in a more uniform process.

Regarding claim 12, although Batz, Jr., et al. do not expressly disclose the use of direct current, one skilled in the art would recognize that the use of direct current is implied by the use of the terms "anode" and "cathode" taken in combination with the disclosed processes performed in the method. Additionally, alternating current would

not achieve the desired results of Batz, Jr., et al. because alternating current would etch any material plated in the previous cycle. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used direct current in the method of Batz, Jr., et al. because it would achieve the desired results.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al. (U.S. Pat. No. 6,017,437) and Poris (U.S. Pat. No. 5,368,711), as applied above to claims 3, 4, 6-8, 12, and 21, and further in view of Icxi et al. (U.S. Pat. No. 3,637,468).

Ting et al. and Poris teach the limitations recited in claims 3, 4, 6-8, 12, and 21 of the instant invention, as explained above in section 11.

The system described by Ting et al. and Poris differs from the instant invention because they do not disclose electrode plate temperature controlling means for controlling the temperature of the electrode plate by flowing temperature-controlling liquid within the electrode plate, as recited in claim 9.

The operation of electrolytic cells generates Joule heating due to the passage of current through the electrodes and the solution and the resistance associated with each element. Electrolytic reactions are temperature dependant. Icxi et al. teach that cooling is often required in electrolytic systems (col. 2, lines 1-5). Icxi et al. further teach the use of electrodes cooled by flowing cooling fluid through the electrode (col. 2, lines 5-10).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system described by Ting et al. and Poris to

use an electrode temperature controlling means as taught by Icxi et al. because electrode cooling means allow the electrodes to be cooled, thus countering the Joule heating effect.

15. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Talieh (U.S. Pat. No. 6,176,992) and Poris (U.S. Pat. No.5,368,711), as applied above to claims 3-7, 12, and 21, and further in view of Icxi et al. (U.S. Pat. No. 3,637,468).

Talieh and Poris teach the limitations recited in claims 3-7, 12, and 21 of the instant invention, as explained above in section 12.

The system described by Talieh and Poris differs from the instant invention because they do not disclose electrode plate temperature controlling means for controlling the temperature of the electrode plate by flowing temperature-controlling liquid within the electrode plate, as recited in claim 9.

The operation of electrolytic cells generates Joule heating due to the passage of current through the electrodes and the solution and the resistance associated with each element. Electrolytic reactions are temperature dependant. Icxi et al. teach that cooling is often required in electrolytic systems (col. 2, lines 1-5). Icxi et al. further teach the use of electrodes cooled by flowing cooling fluid through the electrode (col. 2, lines 5-10).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system described by Talieh and Poris to use an electrode temperature controlling means as taught by Icxi et al. because electrode

cooling means allow the electrodes to be cooled, thus countering the Joule heating effect.

16. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al. (U.S. Pat. No. 6,017,437) and Poris (U.S. Pat. No. 5,367,711), as applied above to claims 3, 4, 6-8, 12, and 21, and further in view of Batz, Jr., et al. (U.S. Pat. No. 6,334,937).

Ting et al. and Poris teach the limitations recited in claims 3, 4, 6-8, 12, and 21 of the instant invention, as explained above in section 11. Ting et al. further disclose that "new fluid is continually introduced into the primary containment region **28**" and overflow is removed through outlet **30** (col. 11, lines 45-48).

The system described by Ting et al. and Poris differs from the instant invention because they do not disclose chemical solution temperature controlling means for controlling the temperature of the chemical solution.

As explained above, electrical processes generate heat through the Joule effect. Batz, Jr., et al. teach that an optimum temperature exists for electrochemical processes and disclose the use of a chemical solution temperature controlling means for maintaining the temperature of the chemical solution within a desired range (col. 4, lines 51-62).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system described by Ting et al. and Poris to use a temperature controller to control the temperature of the chemical solution as

taught by Batz, Jr., et al. because controlling the temperature maintains the chemical solution at the optimum temperature for the electrochemical process.

17. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Talieh (U.S. Pat. No. 6,176,992) and Poris (U.S. Pat. No. 5,368,711), as applied above to claims 3-7, 12, and 21, and further in view of Batz, Jr., et al. (U.S. Pat. No. 6,334,937).

Talieh and Poris teach the limitations recited in claims 3-7 and 21 of the instant invention, as explained above in section 12. Talieh further discloses that the chemical solution is recycled (col. 4, lines 52-57).

The system described by Talieh and Poris differs from the instant invention because they do not disclose chemical solution temperature controlling means for controlling the temperature of the chemical solution.

As explained above, electrical processes generate heat through the Joule effect. Batz, Jr., et al. teach that an optimum temperature exists for electrochemical processes and disclose the use of a chemical solution temperature controlling means for maintaining the temperature of the chemical solution within a desired range (col. 4, lines 51-62).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system described by Talieh and Poris to use a temperature controller to control the temperature of the chemical solution as taught by Batz, Jr., et al. because controlling the temperature maintains the chemical solution at the optimum temperature for the electrochemical process.

18. Claims 11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al. (U.S. Pat. No. 6,017,437).

Regarding claim 11, Ting et al. disclose an electric chemical treatment process for treating a substrate by use of an in-substrate selective electric chemical treatment system which comprises (a) holding means (**13**) for holding an insulating substrate (**35**) (fig. 5); (b) an electrode (**15**) connected, in the periphery of the insulating substrate (**35**), to a conductive pattern formed on the insulating substrate held by the holding means (figs. 5 and 9; col. 3, lines 48-61); (c) chemical solution confining means (**12**) for confining a chemical solution in only a specified region, the specified region being smaller than the insulating substrate or slightly larger than an image displaying section on an active substrate formed on the insulating substrate (fig. 5); (d) a reversed polarity electrode plate (**14**) for applying an electric charge to the chemical solution, the electric charge having polarity opposite to that of the conductive pattern (fig. 5); and (e) chemical solution supplying (**36**) and discharging (**30**) means for supplying and discharging the chemical solution to and from the insulating substrate (**35**) (fig. 5), the treatment process comprising:

a holding step of holding the insulating substrate having the conductive pattern on the holding means (col. 4, lines 19-44);

a chemical solution confining step of supplying a predetermined amount of the specified chemical solution to the specified region on the insulating substrate and confining it in the specified region (col. 4, lines 45-61);

a contacting step of making the reversed polarity electrode plate close to the insulating substrate such that the reversed polarity electrode plate comes in contact with the chemical solution on the upper surface of the insulating substrate (fig. 5; col. 6, line 36 to col. 7, line 54);

a polarity connecting step of bringing the electrode into contact with the conductive pattern in the periphery of the insulating substrate (fig. 9; col. 7, line 55 to col. 9, line 43); and

a treatment step of carrying out a specified treatment by applying a current between the electrode and the reversed polarity electrode plate (col. 10, line 37 to col. 12, line 22).

Regarding claim 22, Ting et al. teach a chemical treatment process for a substrate by use of an in-substrate selective chemical treatment system having (a) a stage (**13**) for holding an insulating substrate (**35**) (fig. 5), (b) a box-like container (**12**) in which a flexible sealing material (**42**) is embedded around an open end in a region, which is smaller than the insulating substrate (**35**) or slightly larger than an active substrate formed on the insulating substrate, the open end being smaller than said region (figs. 5 and 9), (c) a mechanism (**17**) for pressing the box-like container (**12**) against the insulating substrate (**35**) (figs. 5 and 6), and (d) a mechanism (**18-20, 30, 36**) for supplying and discharging a chemical solution, pure water or drying gas to and from the pressed box-like container (fig. 5; col. 9, lines 5-43),

the process comprising:

a holding step of holding the insulating substrate on the stage (col. 4, lines 19-44);

a pressing step of pressing the box-like container against the insulating substrate (col. 6, lines 5-35);

a specified treatment step of applying a specified chemical treatment to the insulating substrate by supplying the chemical solution to the box-like container (col. 4, lines 45-61);

a washing step of washing the inside of the box-like container and the insulating substrate by supplying a washing fluid to them after discharge of the chemical solution col. 9, lines 5-43; col. 11, line 25 to col. 12, line 6); and

a drying step of drying the inside of the box-like container and the insulating substrate by supplying drying gas to them after discharge of the washing fluid (col. 9, lines 5-43).

The method of Ting et al. differs from the instant invention because Ting et al. do not expressly disclose the use of direct current during the processing step, as recited in claims 11 and 22.

Although Ting et al. do not expressly disclose the use of direct current, one skilled in the art would recognize that the use of direct current is implied by the use of the terms "anode" and "cathode" taken in combination with the disclosed processes performed in the method (electroplating and electropolishing). Additionally, alternating current would not achieve the desired results of Ting et al. because alternating current

would etch any material plated in the previous cycle. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used direct current in the method of Ting et al. because it would achieve the desired results. (It is further noted that Ting et al. disclose that the polarity of the potential applied to the electrodes can be switched to change the anode to a cathode and the cathode to an anode (col. 12, lines 15-22).

19. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Talieh (U.S. Pat. No. 6,176,992).

Regarding claim 11, Talieh discloses an electric chemical treatment process for treating a substrate by use of an in-substrate selective electric chemical treatment system which comprises (a) holding means (**16**) for holding an insulating substrate (**Wafer**) (figs. 1B and 2); (b) an electrode (**28**) connected, in the periphery of the insulating substrate (**Wafer**), to a conductive pattern formed on the insulating substrate held by the holding means (fig. 2); (c) chemical solution confining means for confining a chemical solution in only a specified region, the specified region being smaller than the insulating substrate or slightly larger than an image displaying section on an active substrate formed on the insulating substrate (fig. 2); (d) a reversed polarity electrode plate (**30**) for applying an electric charge to the chemical solution, the electric charge having polarity opposite to that of the conductive pattern (fig. 2); and (e) chemical solution supplying (**34**) and discharging (**40**) means for supplying and discharging the

chemical solution to and from the insulating substrate **(Wafer)** (fig. 2), the treatment process comprising:

a holding step of holding the insulating substrate having the conductive pattern on the holding means (col. 4, lines 3-24);

a chemical solution confining step of supplying a predetermined amount of the specified chemical solution to the specified region on the insulating substrate and confining it in the specified region (col. 4, lines 24-57);

a contacting step of making the reversed polarity electrode plate close to the insulating substrate such that the reversed polarity electrode plate comes in contact with the chemical solution on the upper surface of the insulating substrate (fig. 2; col. 4, line 61 to col. 5, line 60);

a polarity connecting step of bringing the electrode into contact with the conductive pattern in the periphery of the insulating substrate (fig. 2; col. 4, line 61 to col. 5, line 60); and

a treatment step of carrying out a specified treatment by applying a current between the electrode and the reversed polarity electrode plate (col. 4, line 61 to col. 5, line 60).

The method of Talieh differs from the instant invention because Talieh does not expressly disclose the use of direct current during the processing step, as recited in claim 11.

Although Talieh does not expressly disclose the use of direct current, one skilled in the art would recognize that the use of direct current is implied by the use of the terms “anode” and “cathode” taken in combination with the disclosed processes performed in the method. Additionally, alternating current would not achieve the desired results of Talieh because alternating current would etch any material plated in the previous cycle. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used direct current in the method of Talieh because it would achieve the desired results.

20. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Batz, Jr., et al. (U.S. Pat. No. 6,334,937).

Regarding claim 11, Batz, Jr., et al. disclose an electric chemical treatment process for treating a substrate by use of an in-substrate selective electric chemical treatment system which comprises (a) holding means (**30**) for holding an insulating substrate (**25**) (fig. 1); (b) an electrode (**150**) connected, in the periphery of the insulating substrate (**25**), to a conductive pattern formed on the insulating substrate held by the holding means (fig. 6); (c) chemical solution confining means (**35**) for confining a chemical solution in only a specified region, the specified region being smaller than the insulating substrate or slightly larger than an image displaying section on an active substrate formed on the insulating substrate (fig. 1); (d) a reversed polarity electrode plate (**55**) for applying an electric charge to the chemical solution, the electric charge having polarity opposite to that of the conductive pattern (fig. 1); and (e) chemical

solution supplying **(50)** and discharging **(40)** means for supplying and discharging the chemical solution to and from the insulating substrate **(25)** (fig. 1), the treatment process comprising:

a holding step of holding the insulating substrate having the conductive pattern on the holding means (col. 16, line 55 to col. 18, line 7);

a chemical solution confining step of supplying a predetermined amount of the specified chemical solution to the specified region on the insulating substrate and confining it in the specified region (col. 7, lines 18-53);

a contacting step of making the reversed polarity electrode plate close to the insulating substrate such that the reversed polarity electrode plate comes in contact with the chemical solution on the upper surface of the insulating substrate (fig. 1; col. 7, lines 18-53);

a polarity connecting step of bringing the electrode into contact with the conductive pattern in the periphery of the insulating substrate (fig. 1; col. 7, lines 18-53); and

a treatment step of carrying out a specified treatment by applying a current between the electrode and the reversed polarity electrode plate (col. 7, lines 18-53).

The method of Batz, Jr., et al. differs from the instant invention because Batz, Jr., et al. do not expressly disclose the use of direct current during the processing step, as recited in claim 11.

Although Batz, Jr., et al. do not expressly disclose the use of direct current, one skilled in the art would recognize that the use of direct current is implied by the use of

the terms "anode" and "cathode" taken in combination with the disclosed processes performed in the method. Additionally, alternating current would not achieve the desired results of Batz, Jr., et al. because alternating current would etch any material plated in the previous cycle. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used direct current in the method of Batz, Jr., et al. because it would achieve the desired results.

Response to Arguments

21. Applicant's arguments filed February 25, 2004, have been fully considered but they are not persuasive.

22. Regarding the rejection of claims 3, 4, 6-8, and 21 over Ting et al., Applicant has argued that Ting et al. "does not disclose a system having structural components, or method steps, for accomplishing both detection and repair of pinholes in an active substrate" (see pages 57-58 of Applicant's response). This argument is not persuasive because Ting et al. (as modified by the teachings of Poris) teach all of the structural and method limitations recited in the instant claims. Finding and repairing pinholes is recited only in the preamble of the claims. The term pinhole is not recited anywhere within the structural limitations or method limitations recited in the claims. How does the structure of the system taught by Ting et al. and Poris differ from the structure in the instant claims? As currently claimed, there are no structural limitations specifically directed towards finding and repairing pinholes that distinguish the instant claims over the prior art.

23. In response to the rejection of the claims over the reference of Talieh, Applicant relies on the same argument addressed above (see pages 58-59 of Applicant's response). The combination of Talieh and Poris teaches all of the structural and method limitations recited in the instant claims.

24. Regarding the rejection of claims 3, 7, and 21 over Batz et al., Applicant argues that Batz et al. do not teach a structure or method for finding pinholes (see pages 60-61 of Applicant's response). This argument is not persuasive because Applicant has not claimed a structure or method for finding pinholes. There is no distinction between the structure and method taught by Batz et al. (in view of Poris) and the instant claims.

25. Applicant relies on the arguments addressed above in regard to the rejections of claims 9-12 (see pages 61-62 of Applicant's response). In addition, Applicant argues that the method of claim 22 is a chemical treatment process that does not use electrochemical means (see page 61 of Applicant's response). This is not persuasive because an electrochemical treatment process is a chemical treatment process and the claim is open to either interpretation.

26. Regarding the rejection of claims 11 and 12 over Batz et al., Applicant restates the argument addressed above in section 24. Although Applicant states that the reference "does not disclose a system having structural components, or method steps, for accomplishing both detection and repair of pinholes on an active substrate," Applicant does not identify how the structures of the prior art and the instant claims differ.

Conclusion

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

blm
April 20, 2004

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